

REMARKS

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Claim Amendments

Claim 1 has been amended to incorporate the limitations of claim 16, as a result of which claim 16 has been cancelled, without prejudice or disclaimer.

Claim 1 has also been amended to delete the limitation “(a) a non-woven fabric is a needle-punched non-woven fabric”.

New claim 24 has been added, wherein the constituent fiber of (b) the surface material is restricted to a thermoplastic fiber having fineness of 0.5 to 30 dtex, based on page 9, line 28 to page 10, line 1; page 13, lines 27-28; and page 21, lines 21-22 of the specification.

New claim 25 has also been added, and corresponds to original claim 8.

Patentability Arguments

The patentability of the present invention over the disclosures of the references relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

Discussion regarding Applicants' invention

The sound-absorbing material recited in amended claim 1 is as follows:.

A sound-absorbing material, wherein (a) a non-woven fabric with a mass per unit area of 150 to 800 g/m² and a bulk density of 0.01 to 0.2 g/cm³ and (b) a surface material with an air permeability of not more than 50 cc/ cm² / sec measured according to JIS L-1096 are layered by bonding, and the number of the bonding points of the non-woven fabric and the surface material is not more than 30 points/cm², and the ratio of the total surface area of the bonding points to the total surface area of the bonding points and the non-bonding points is not more than 30%, and

(b) the surface material is a spun bonded non-woven fabric or a wet-Laid non-woven staple fabric.

Here, when “the total surface area of bonding points” is defined as “B” and “the total

surface area of bonding points and non-bonding points” is defined as “A+B”, the ratio of the total surface area of bonding points (B) to the total surface area of bonding points and non-bonding points (A+B) is represented by the formula: $\{B/(A+B)\} \times 100 (\%)$. See page 26, line 25 to page 27, line 1 of the specification.

As described below, the cited art references (D1-D8 discussed below) neither disclose nor suggest the sound-absorbing material of Applicants’ claims.

Further, as shown in the additional experimental data executed by Dr. Kosuge, the sound-absorbing material of Applicants’ claims is excellent in sound absorbency by restricting the ratio of bonding area to not more than 30%. Please see the attached Declaration Under 37 CFR 1.132.

Rejections Under 35 U.S.C. § 103(a)

Rejection of claims 1 and 20-23 under U.S.C. § 103(a) over Tanaka (JP2003082568)
(hereafter “D1”) in view of Enohara (JP2003049351) (hereafter “D2”)

Reference D1

In D1, a needle-punching method is used to laminate the nonwoven fabric (A) and the staple fiber nonwoven fabric (B). However, D1 neither discloses nor suggests (1) the number of the bonding points of the non-woven fabric and the surface material, or (2) the ratio of the total surface area of the bonding points to the total surface area of the bonding points and the non-bonding points, as required by Applicants’ claims.

The effect of Applicants’ claimed material would not have been obvious based on the description of D1. Accordingly, the invention of Applicants’ claim 1 would not have been obvious to one of ordinary skill in the art based on the teachings of D1.

Reference D2

As to bonding points of the non-woven fabric and the surface material, D2 also fails to disclose or suggest (1) the number of the bonding points of the non-woven fabric and the surface material, and (2) the ratio of the total surface area of the bonding points to the total surface area of the bonding points and the non-bonding points. Thus, D2 fails to remedy the deficiencies of D1.

Combination of References D1 and D2

Until the time of filing the priority application for the above-identified application, it was not known that the degree of bonding between the base material and the surface material influences the sound absorption coefficient of a resultant layered material. The present inventors found, **for the first time**, that the fewer the number of the bonding points is, the higher the sound absorption coefficient of a resultant sound-absorbing material becomes. In other words, a higher degree of bonding between the surface material and the non-woven fabric (a larger number of bonding points or a larger surface area for bonding) allows the surface material and the non-woven fabric to be more firmly bonded together, but the degree of bonding there-between is too high, and the sound absorption coefficient of a resultant sound-absorbing material is lowered.

In the case where there is no bonding between the surface material and the non-woven fabric, the sound absorption coefficient of a resultant sound-absorbing material is enhanced, but problems such as peeling off in use and poor handling occur.

From such a viewpoint, the present inventors found that **the number of bonding points between the surface material and the non-woven fabric is preferably not more than 30 points/cm²**. Furthermore, the present inventors found that **the ratio of the total surface area of the bonding points to the total surface area of the bonding points and the non-bonding points is preferably not more than 30%**.

As described above, such a relationship between the bonding degree and the sound absorption coefficient of a resultant layered material is neither disclosed nor suggested in D1 or D2. Accordingly, even if D1 and D2 are combined, the subject matter of Applicants' independent claim 1 would not have been obvious to one of ordinary skill in the art based on the combination of references relied upon by the Examiner.

Furthermore, as discussed above, Applicants submit herewith a Declaration Under 37 CFR 1.132, containing experimental data showing that the sound-absorbing material of Applicants' claims is unexpectedly excellent in sound absorbency. In these experiments, the normal incidence sound absorption coefficients and the area under the graph of the normal incidence sound absorption coefficient of the sound-absorbing materials of Applicants' invention were compared with those of comparative sound-absorbing material (the ratio of bonding area: 100%).

It is clear from these experimental data (for example, Tables 2 and 3) that Applicants' sound-absorbing material effectively absorbs sound (especially, relatively high frequency sound) as compared with comparative sound-absorbing materials.

Accordingly, the invention of Applicants' independent claim 1 would not have been obvious to one of ordinary skill in the art based on the cited combination of D1 and D2.

Since claims 20-23 are dependent on claim 1, these claims are also patentable over the combination of D1 and D2, for the reasons articulated above. [Claim 16 has been cancelled.]

Rejection of claims 2-7 and 14 under U.S.C. § 103(a) over D1 in view of D2,
and further in view of Smith (U.S. Patent No. 5,766,745) (hereafter "D3"), and
Fottinger (U.S. Patent No. 5,279,878) (hereafter "D4")

As previously asserted in the response filed February 4, 2009, D3 fails to teach or suggest the surface material recited in Applicants' claim 1.

Furthermore, D4 fails to teach or suggest the non-woven fabric and the surface material recited in Applicants' claim 1.

Accordingly, even if these cited references are combined with the teachings of D1 and D2, the invention recited in Applicants' claim 1 would not have been obvious to one of ordinary skill in the art. Additionally, since claims 2-7 and 14 are dependent on claim 1, these claims are also patentable over the combination of D1, D2, D3 and D4, for the reasons articulated above.

Rejection of claims 10-13 under U.S.C. § 103(a) over D1 in view of D2,
and further in view of Bair (U.S. Patent No. 4,957,794) (hereafter "D5"), D3 and D4

As previously argued in the response filed February 4, 2009, D4 and D5 also fail to teach or suggest the surface material recited in Applicants' claim 1.

Accordingly, even if these cited references were combined with D1 and D2, the invention recited in Applicants' claim 1 would not have been obvious to one of ordinary skill in the art. Additionally, since claims 10-13 are dependent on claim 1, these claims are also patentable over the combination of D1, D2, D3, D4 and D5, for the reasons articulated above.

Rejection of claim 15 under U.S.C. § 103(a) over D1 in view of D2, and
further in view of Sano (JP 2002-182655) (hereafter “D6”)

As previously argued in the response filed February 4, 2009, D6 discloses (on page 2, column 2, line 49 to page 3, column 3, line 7) ([0008]) of Japanese laid-open patent gazette that “In the acoustic absorber according to the present invention, it is necessary to use a surface material consisting of cloth with the mass per unit area of 30g/m^2 or more and **an air permeability of not less than $80\text{ cm}^3/\text{cm}^2/\text{sec}$** measured according to JIS L-1096.... **If the air permeability is less than $80\text{ cm}^3/\text{cm}^2/\text{sec}$, the sound absorbency performance of the base material cannot be sufficiently effected.**” [The English translation of page 2, column 2, line 49 to page 3, column 3, line 7 of JP2002182655 was previously filed with the response of April 11, 2008.]

On the other hand, Applicants’ claimed surface material has **an air permeability of not more than $50\text{ cc/cm}^2/\text{sec}$** . Accordingly, D6 clearly teaches away from Applicants’ claimed material.

Further, since claim 15 is dependent on claim 1, this claim is also patentable over the combination of D1, for the reasons articulated above.

Rejection of claims 17-19 under 35 U.S.C. § 103(a) over D1 in view of D2,
and further in view of Haussling (U.S. Patent No. 5,068,001) (hereafter “D7”) and
Noxon (U.S. Patent No. 5,035,298) (hereafter “D8”)

Neither D7 nor D8 teaches or suggests the non-woven fabric and the surface material of Applicants’ claims. Accordingly, even if these cited references were to be combined with D1 and D2, the invention recited in Applicants’ claim 1 would not have been patentable to one of ordinary skill in the art. Further, since claims 17-19 are dependent on claim 1, these claims are patentable over the combination of references D1, D2, D7 and D8 for the reasons articulated above.

Discussion Regarding New Claim 24

It is described in D1 that the fiber constituting the surface material is a super fine fiber having a fiber diameter of not more than $6\text{ }\mu\text{m}$ (claim 1). “Six μm ” is about 0.4 dtex. Further, it

is described in D1 that when laminating a filament nonwoven fabric on a super fine fiber nonwoven fabrics (i.e., the surface material) by needle punch method, punched pores by needles may sometimes remain and thereby, resulting in the leak of air to impair sound absorption property. It is also described in D1 that when an elastomer is used, the size of pores formed becomes smaller again by deformation and sound absorption property hardly falls. Therefore, in D1, the surface material is preferably a thermoplastic elastomer.

On the other hand, the surface material of Applicants' new claim 24 is not a thermoplastic elastomer, but rather a thermoplastic fiber having fineness of **0.5 to 30 dtex**. Accordingly, the surface material of Applicants' claim 24 is quite different from that used in D1, and therefore the subject matter of claim 24 would not have been obvious to one of ordinary skill in the art based on the teachings of D1, taken alone, or in combination with any of the other cited references.

Conclusion

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

Akira TAKAYASU et al.

By 

Amy E. Schmid
Registration No. 55,965
Attorney for Applicants

AES/emj
Washington, D.C. 20005-1503
Telephone (202) 721-8200
Facsimile (202) 721-8250
October 23, 2009